RHIC Tunnel Gas Cooled Lead Temperature Sensors Replacement Procedure

I. INTRODUCTION - This document explains the procedure of replacing the RHIC tunnel temperature sensors that are mounted on the top of the gas cooled lead flanges, as well as for the Snake/Rotation magnets, which has temperature sensors that are mounted on the side of the gas cooled leads as in Photo 8. Only one kind of temperature sensor was built, it is shown as in the following photo.

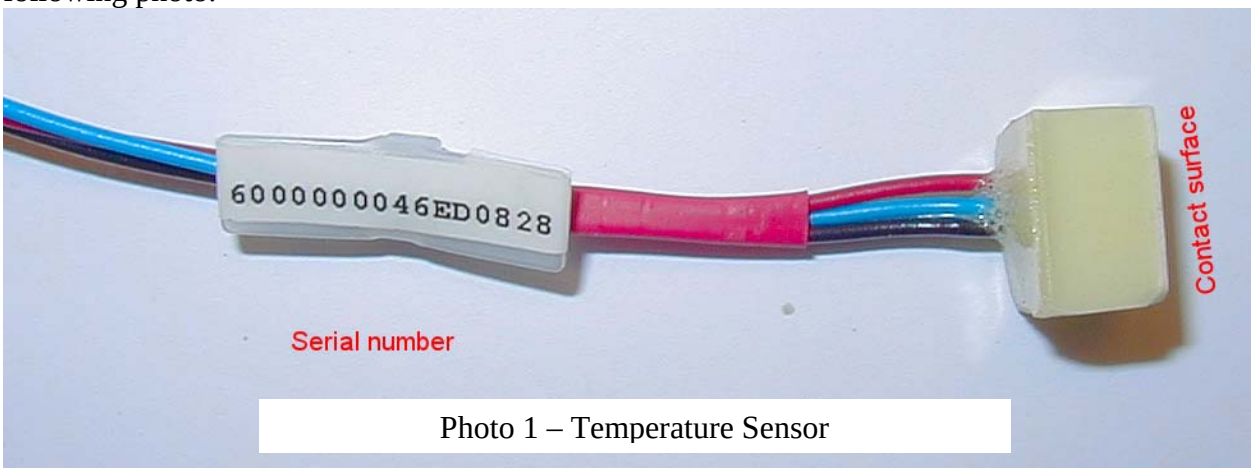


Photo 1 – Temperature Sensor

II. SENSOR LOCATIONS - For the RHIC tunnel, we have 1032 sensors to monitor the DXs, Triplets (Q1, Q2 & Q3), Correctors (Q4 to Q21), and Snakes/Rotators Gas-Cooled-Leads. These sensors are distributed throughout the whole ring; their mounting methods are similar between these four types of magnets. The following photos show the locations of the mounted temperature sensors.

Photo 2 – DX Lead-Tree location

Photo 3 – Q1, Q2 and Q3 Lead-Tree locations

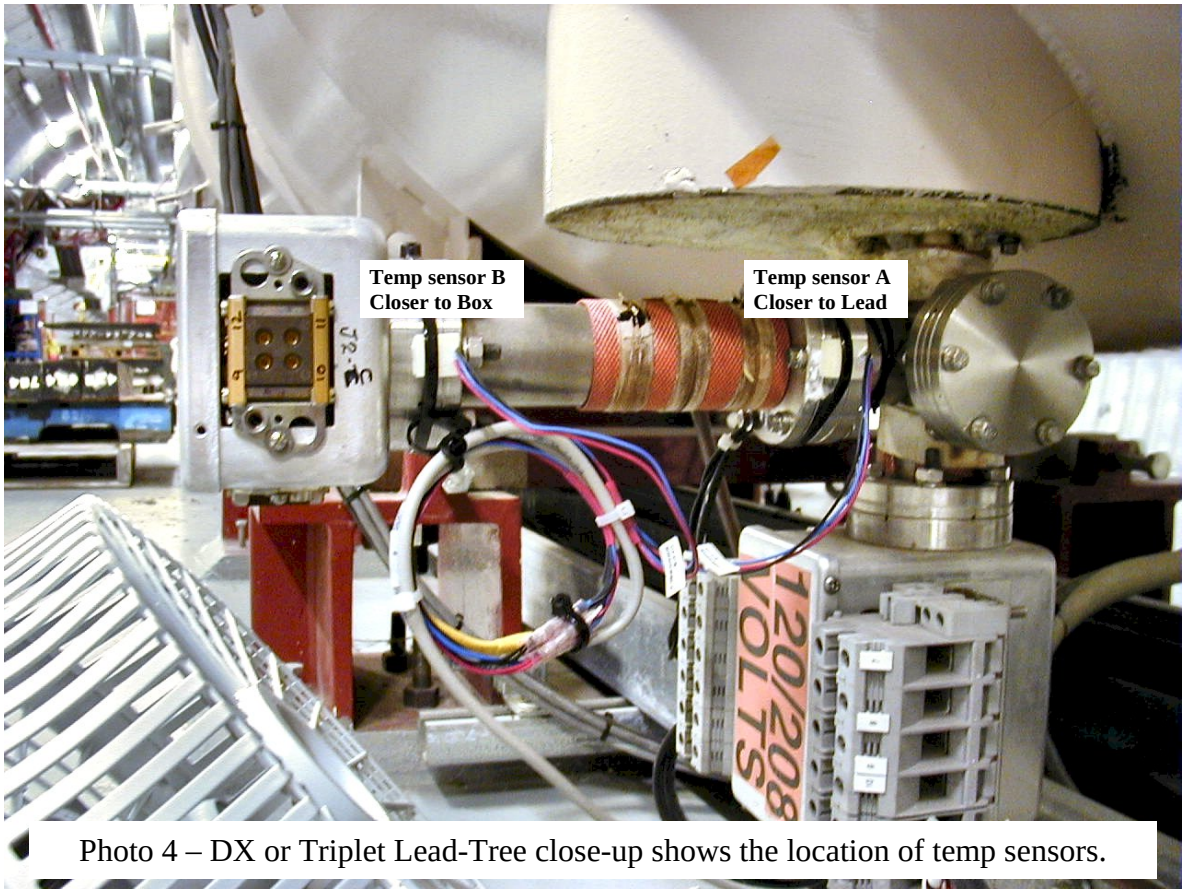


Photo 4 – DX or Triplet Lead-Tree close-up shows the location of temp sensors.

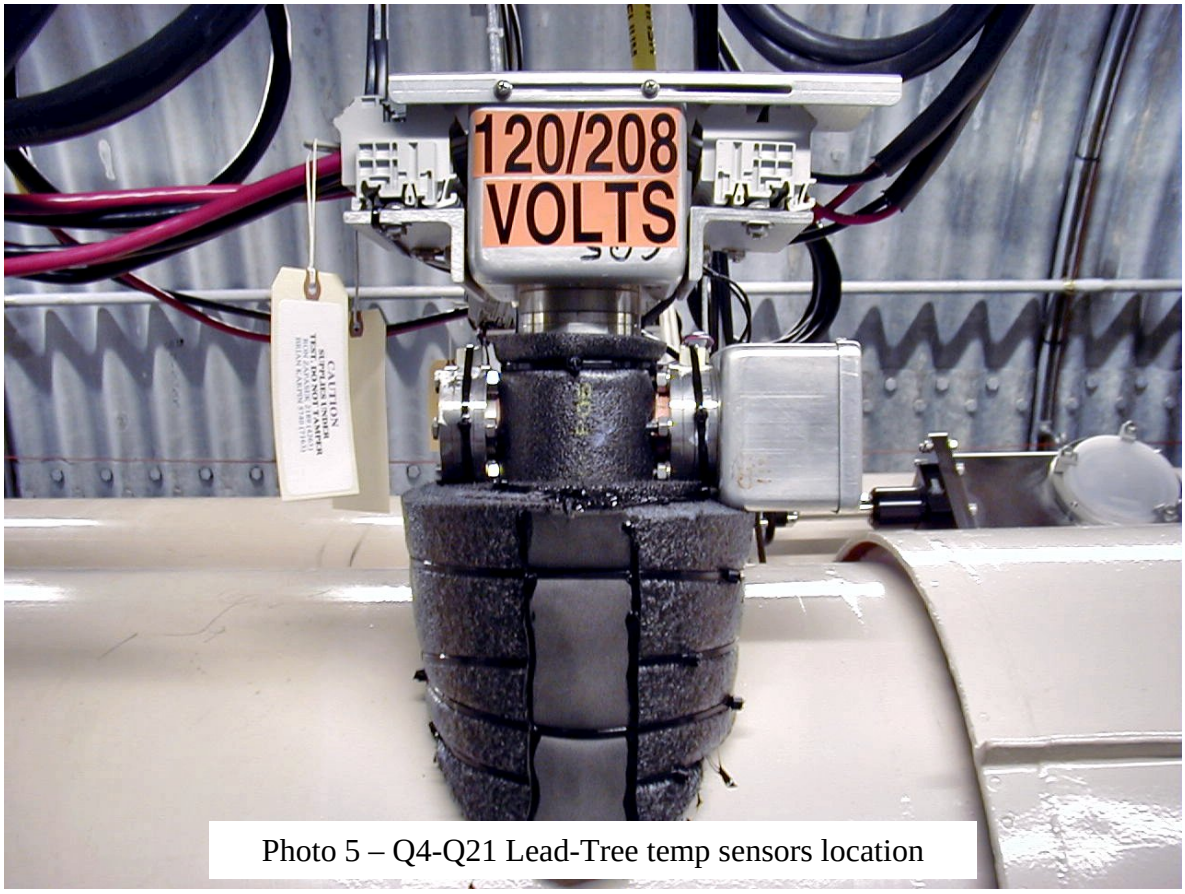


Photo 5 – Q4-Q21 Lead-Tree temp sensors location

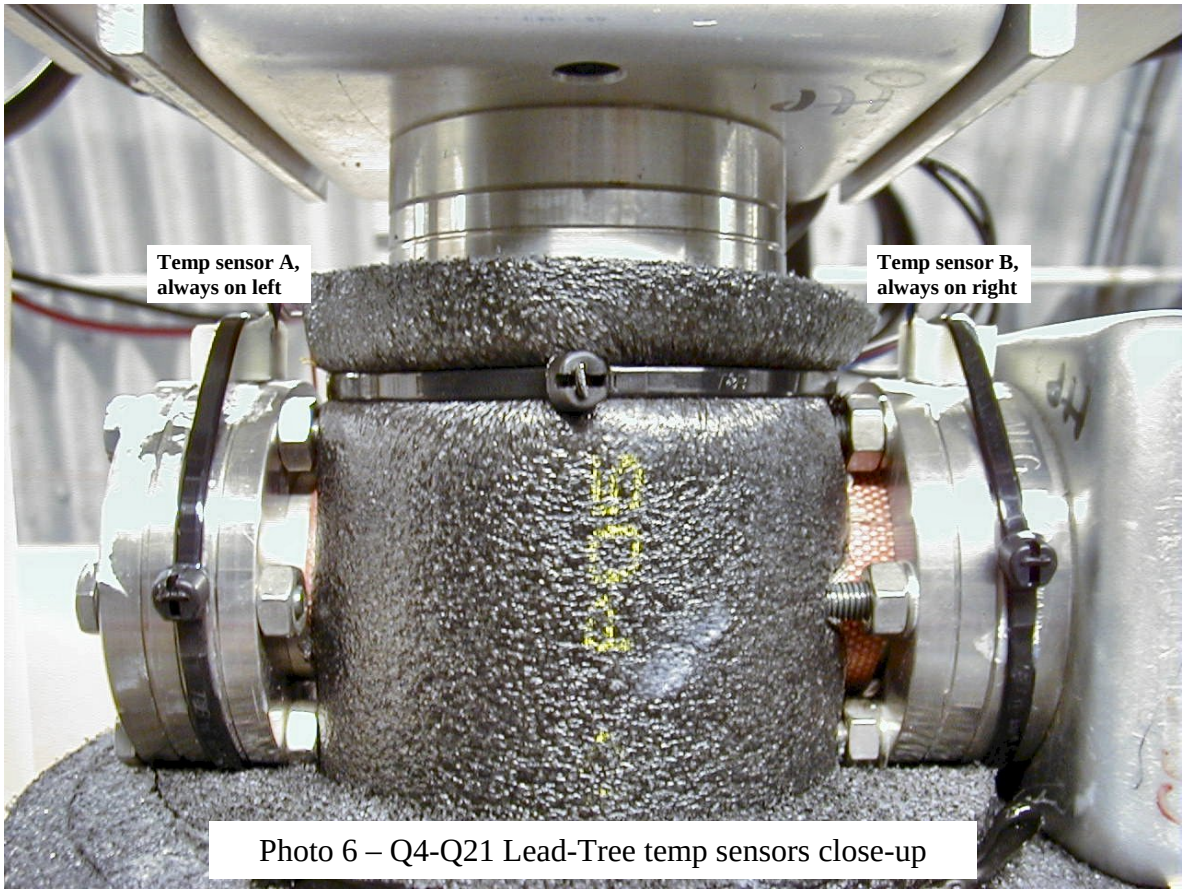


Photo 6 – Q4-Q21 Lead-Tree temp sensors close-up

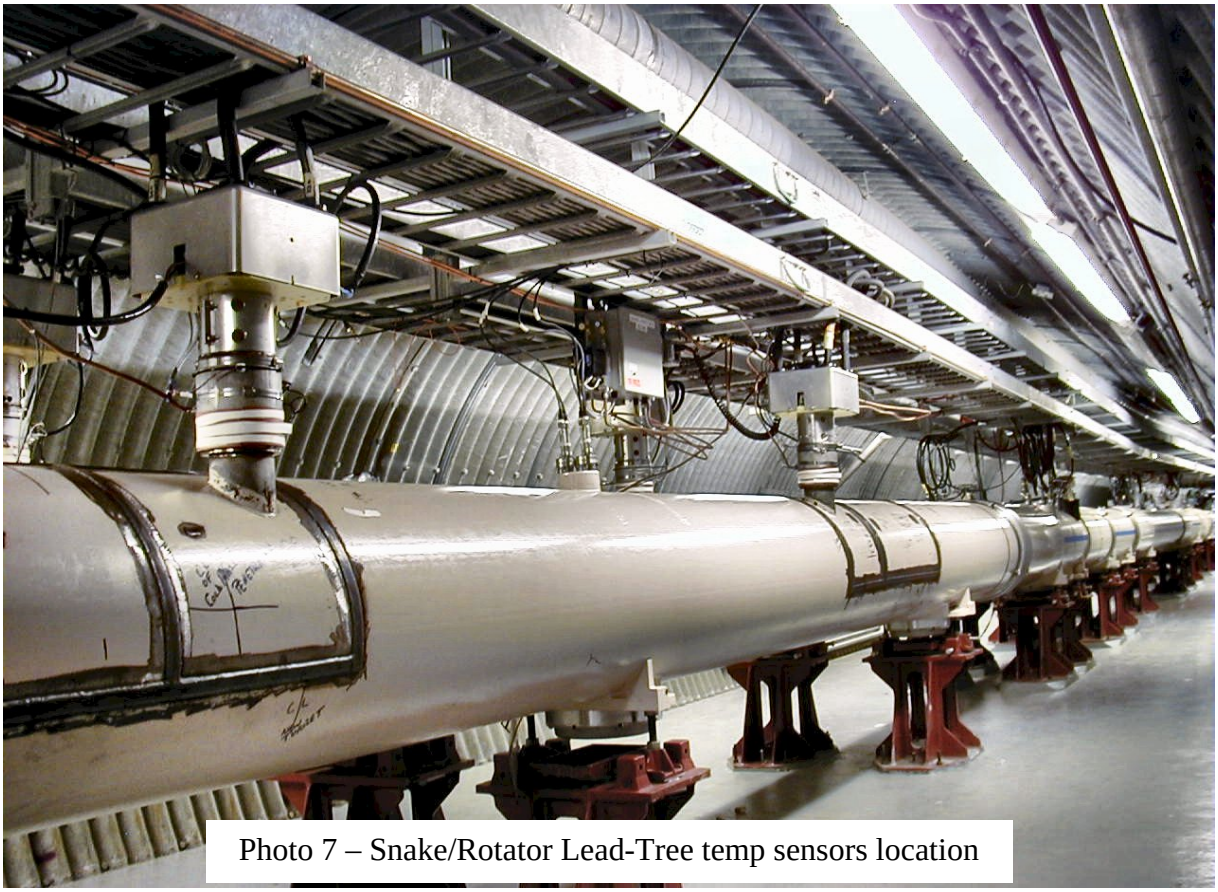


Photo 7 – Snake/Rotator Lead-Tree temp sensors location

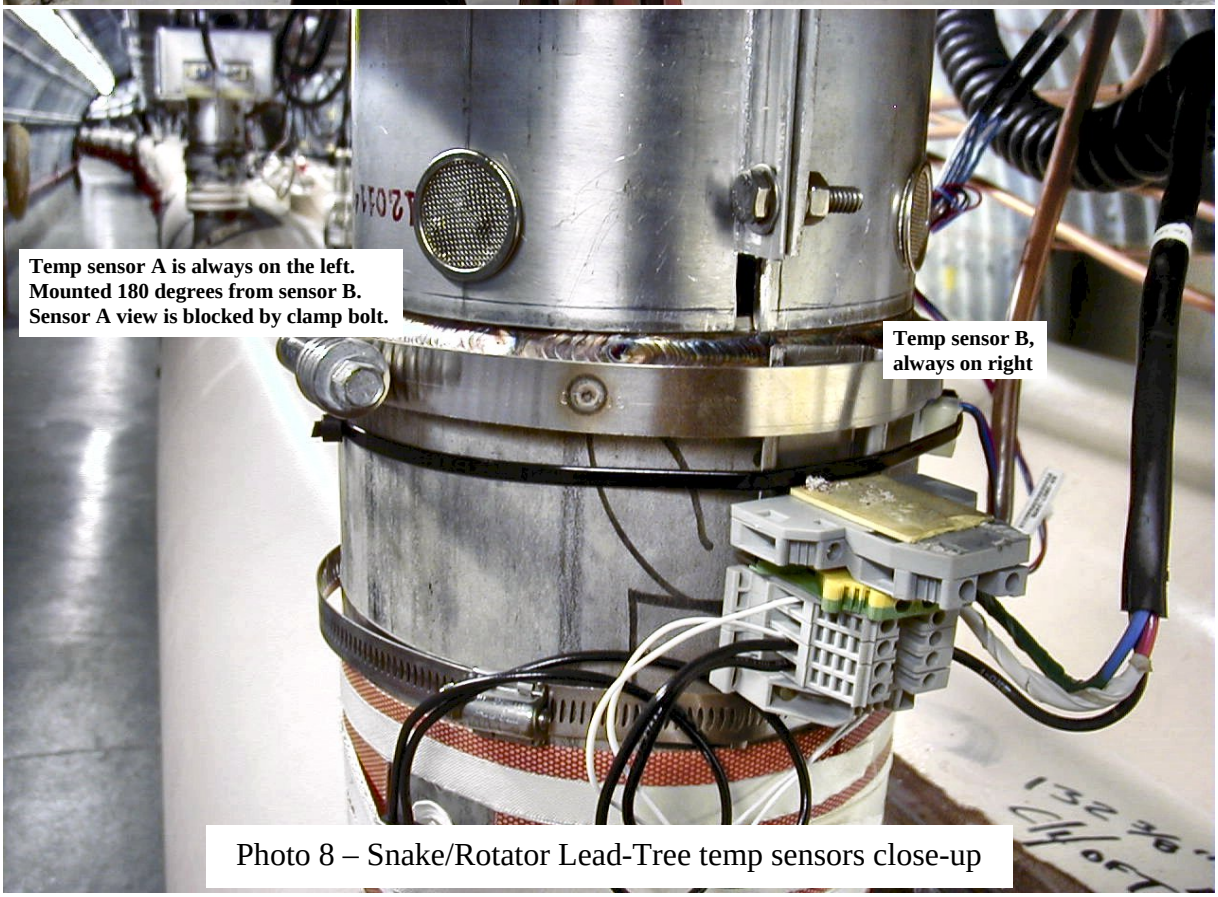
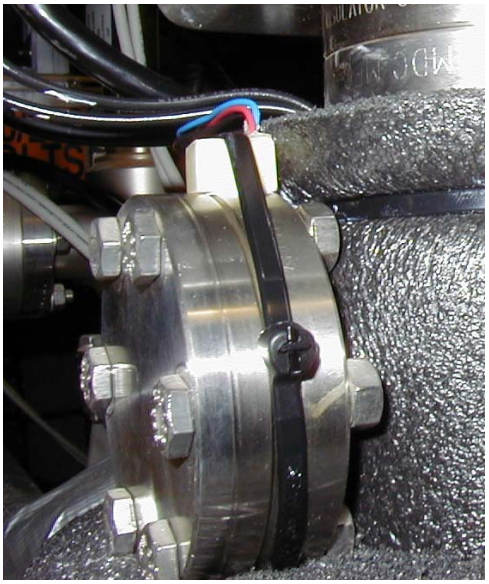


Photo 8 – Snake/Rotator Lead-Tree temp sensors close-up

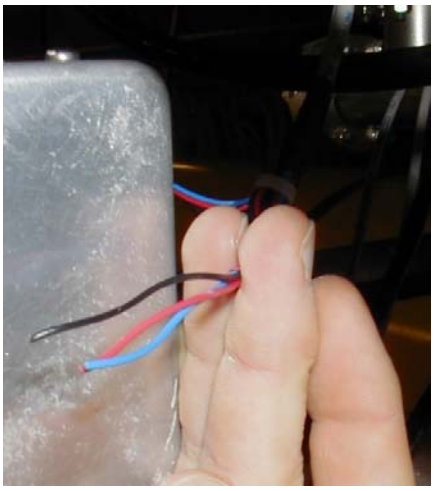
III. SENSOR REPLACEMENT PROCEDURE

1. There is no need to turn off the power to the 1-wire temperature sensing system. This system consists of three wires; the power wire is fed from a 5V, 0.2A power supply, the signal wire, which is switching at 19 KHz with current about 3 mA, and a current return wire that is referenced to earth ground.
   There is no hazard on working with the temperature sensor wires because they carry low voltage and current, but the surrounding areas do have live 115VAC cables. Work with caution and confirm the correct wire before cutting.
2. Obtain a spare temperature sensor – Inside the plastic bag, there should be one temperature sensor, one traveling sheet with serial number, and three red color butt spices.
3. Determine the location of the sensor – The location labels for the DX and Triplets magnets are glued on the front of the magnets, whereas the Correctors (Q4-Q21) and the Snake/Rotators location labels are glued on the side of the overhead cable trays.

4. Bring tools to the failed sensor location – Needed tools are wire cutter, wire stripper, butt-spice crimper, and tie wraps.
5. Determine the bad sensor by matching location and the serial number from the sheet with bad sensor information.
6. After located the bad sensor, cut the tie wrap that holds the bad sensor.

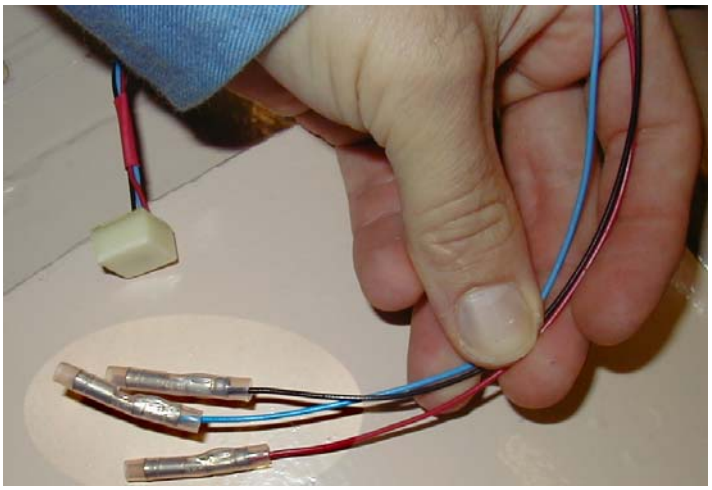


7. Remove the bad sensor from the flange, and then cut the wires about 2 inches from the end of the sensor cable. The cutting sequence is Blue color (signal) wire first, then the Red color (5V), finally the Black color (common) wire. This way the circuit is always referenced to earth ground, eliminated floating voltage.



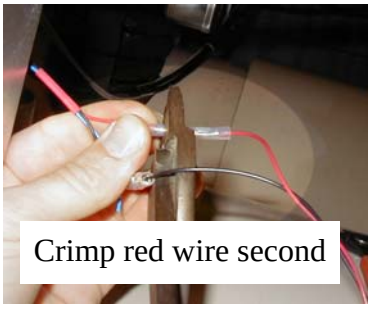
Wire cutting sequence:
1. Blue color wire
2. Red color wire
3. Black color wire

8. Remove the good sensor from the plastic bag, and then crimp one butt spice for each wire. Total three wires are needed to be crimped.



9. Crimp the good sensor to the cut wire that was done in step 7. DO NOT strip all three wires at once. This way will eliminate any possibility of shorting. Strip and crimp the Black (ground) wire first, then the Red (power) wire, and finally the Blue (signal) wire.

Crimp black wire first



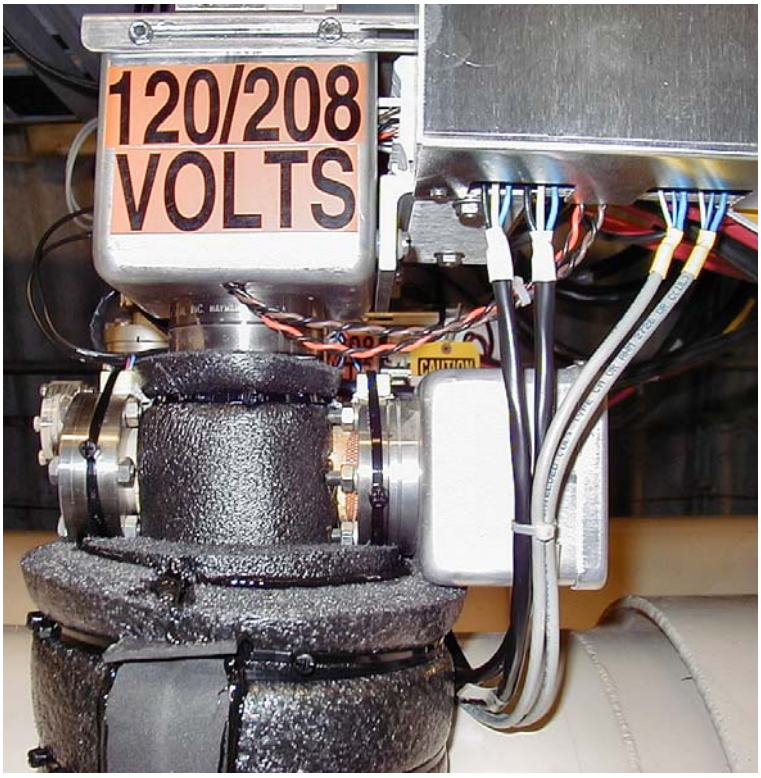
Crimp red wire second

Crimp blue wire last

10. Position the good sensor on the flange, the wire from the sensor should be close to the vertical section of the gas cooled lead. This will minimize wire interfere with fingers, secure the sensor with tie wrap when sensor is positioned correctly.

11. Neatly route and then tie wrap the cable in the back of the sensor.

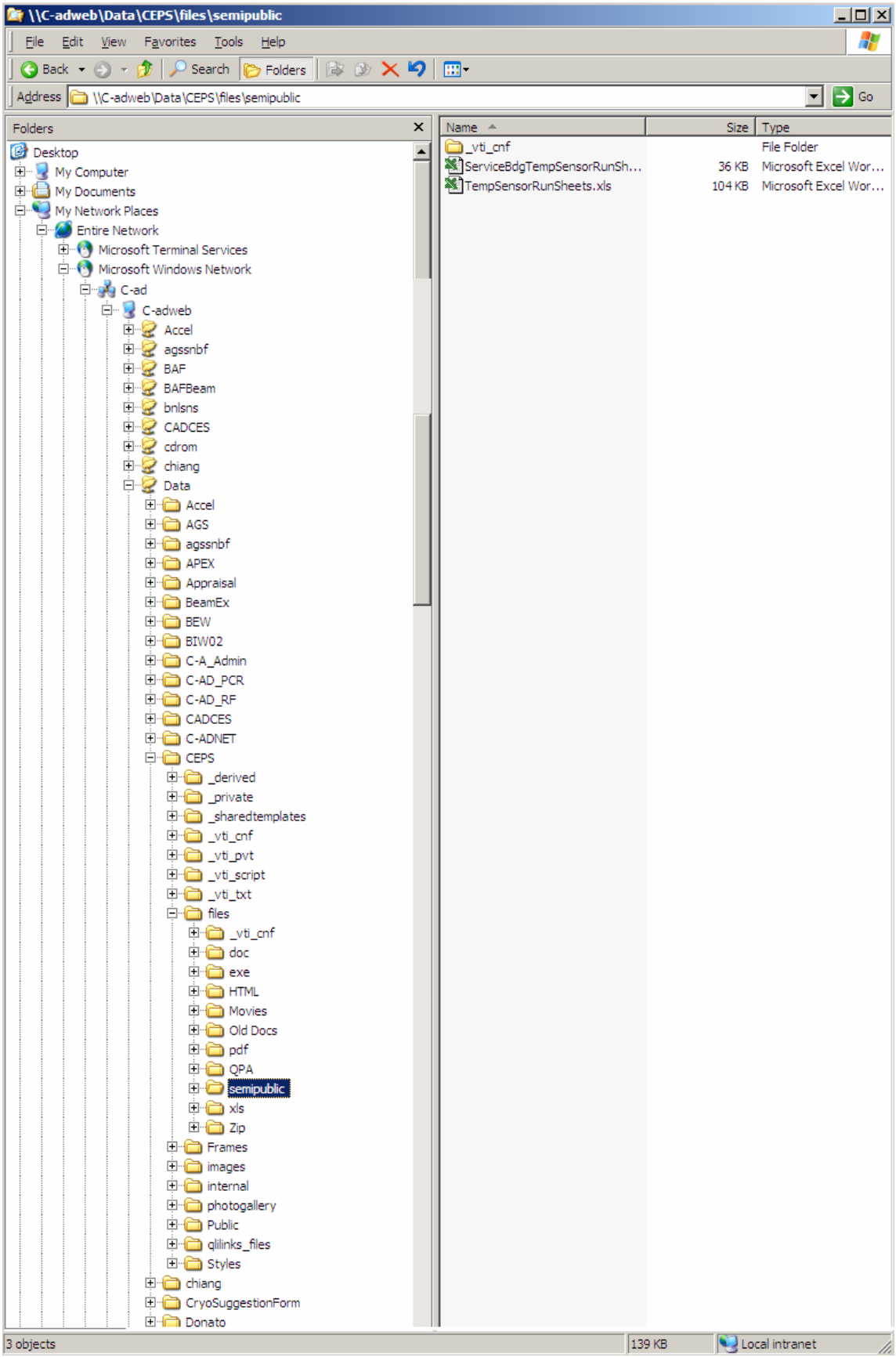
12. Inspect and clean the work area. Do not lose the traveler, you will need it later to enter the new serial number to the database. The completed replacement job should look similar to the following photo.



IV. UPDATE TEMPERATURE SENSOR DATABASE

You must have database access privilege in order to change the temp sensor database. At the present, Ron Zapasek's RHIC PS Technical stuffs had assigned the privilege.

1. You must log onto a recognized domain such as bnl or C-ad with your ID and password. From "My Network Places", "Entire Network", "Microsoft Windows Network", navigate to subdirectory: \\C-adweb\Data\CEPS\files\semipublic, as is shown in the following page.
2. Double click the file on the right side named TempSensorRunSheets.xls.
3. Locate the bad sensor serial number on the spread sheet, and then replace that serial number with the one from the traveler that held the sensor you replaced earlier.
4. Save, exit and close all open files.
5. This completes the temperature sensor replacement task.


\\C-adweb\Data\CEPS\files\semipublic
File Edit View Favorites Tools Help
Back Search Folders
Address \\C-adweb\Data\CEPS\files\semipublic
Go
Folders
Desktop
My Computer
My Documents
My Network Places
Entire Network
Microsoft Terminal Services
Microsoft Windows Network
C-ad
C-adweb
Accel
agssnbf
BAF
BAFBeam
bnlsns
CADCES
cdrom
chiang
Data
Accel
AGS
agssnbf
APEX
Appraisal
BeamEx
BEW
BIW02
C-A_Admin
C-AD_PCR
C-AD_RF
CADCES
C-ADNET
CEPS
_derived
_private
_sharedtemplates
_vti_cnf
_vti_pvt
_vti_script
_vti_txt
files
_vti_cnf
doc
exe
HTML
Movies
Old Docs
pdf
QPA
semipublic
xls
Zip
Frames
images
internal
photogallery
Public
qlilinks_files
Styles
chiang
CryoSuggestionForm
Donato
Name
Size
Type
_vti_cnf
File Folder
ServiceBdgTempSensorRunSh...
36 KB
Microsoft Excel Wor...
TempSensorRunSheets.xls
104 KB
Microsoft Excel Wor...
3 objects
139 KB
Local intranet